

WASTEWATER TREATMENT DIVISION CAPITAL IMPROVEMENT PROGRAM

Introduction to Program, Goals, and Highlights

The Wastewater Treatment Division's (WTD) Capital Improvement Program (CIP) budget request for 2006 is \$364 million. The 2006-2011 proposed budget plan amounts to \$1.5 billion. The six year plan budget ordinance attachment for the WTD capital program has been modified this year to report budgetary amounts only rather than a combination of budgetary amounts and cash flow expenditures.

The mission of the WTD is to protect public health and the environment by conveying and treating the region's wastewater. Since 1958, when King County citizens voted to build a regional wastewater system to clean the polluted waters of Lake Washington and Puget Sound, we have helped to dramatically improve water quality while recycling and reusing natural resources.

The objectives of the capital program are to:

- ensure continued operation and reliability of existing wastewater conveyance and treatment assets;
- enhance regional water quality in compliance with federal, state and local regulations; and
- ensure sufficient capacity to meet the long-term needs of the regional service area.

Attaining these objectives is the basis for the projects included in the 2006 CIP budget.

In June 2001, the King County Council passed the Wastewater Flexible Budgeting Ordinance (King County Code, Chapter 4.04) creating a budgeting process for the WTD CIP program. This comprehensive ordinance defines a process that provides accountability for spending while allowing the division the flexibility needed to achieve its mission.

The 2006 WTD CIP proposed budget is the fifth budget submitted under the flexible budgeting ordinance. In accordance with the ordinance, the spending authority for most capital projects is appropriated at the fund level. Minor asset management projects are appropriated at the category level as described below. This allows WTD the flexibility to transfer funds among projects within the appropriation category, subject to reporting requirements, and to react to special circumstances as they occur. In each case, only year one of budget authority is appropriated. Additionally, the full term of multi-year construction contracts is appropriated in the first year of the contract. Inclusion of the full contract value in year one gives rise to fluctuations in appropriation requests over time. For example, a large multi-year contract will increase the appropriation in the first year relative to the subsequent years.

**Wastewater Treatment Division
2006 Proposed Appropriation**

	Proposed Appropriation
WTD Capital Projects	356,876,762
Minor Asset Management Categories	
Structure and Site Improvements	162,000
Mechanical Equipment	1,387,802
Odor and Corrosion	330,338
Pipeline Replacement	1,387,802
Process Replacement/Improvement	1,528,658
Electrical, Instrumentation and Control	2,301,000
Total	363,974,362

Financial Planning and Policy Overview

In May 2005, the King County Council adopted a monthly wholesale sewer rate of \$25.60 and a capacity charge of \$34.05 for 2006. Cash flows generated by the rate and capacity charge and the sale of revenue bonds are sufficient to fund the accompanying appropriation request while fully complying with WTD's financial policies.

The WTD CIP is funded primarily through proceeds from revenue bond sales, short-term borrowing, capacity charge revenues and transfers from the operating fund. The operating fund derives the majority of its revenue from monthly charges to sewer customers that are collected by WTD's component agencies. Transfers from the operating fund to the capital program are the result of additional cash generated to meet the financial policy requirement of maintaining a debt service coverage ratio of no less than 115 percent of all debt service payments. WTD uses these transfers to reduce the amount of borrowing necessary to finance the capital program.

The capacity charge is based on the new capacity charge methodology adopted by the King County Council in October 2001 in Ordinance 14129. The methodology provides an equitable basis for allocating the costs of the wastewater treatment system to the customers that use it. Specifically, it enacts the Regional Wastewater Services Plan (RWSP) policy of growth paying for growth by ensuring new customers bear their equitable share of the cost of building new capacity in the system.

Capital Project Budget Estimates

WTD uses a consistent and systematic approach across the division to develop initial project budgets and update existing budgets. The following section provides an overview of the project budgeting process, including assumptions for contingency and inflation.

The initial project budget is almost always derived from a planning-level budget estimate. These estimates are prepared early in the life of the project and provide the expected capital construction or implementation costs. These estimates are based on:

- 1) the project scope as it is known at that time;
- 2) industry standard pricing and contingencies;
- 3) historical project comparisons;
- 4) in-house and/or consultant experience; and
- 5) benchmarking, estimating programs, and in-house construction cost models.

The capital implementation cost estimate is used to derive additional project costs, including planning, engineering, construction, right-of-way/land acquisition costs, staff labor and overhead costs. Using extensive historical information and management input, the parameters and standards used in allocating these additional costs vary according to such things as: (1) the size and complexity of a project, (2) whether engineering is performed by County staff or consultants, and (3) whether construction management is performed by County staff or consultants.

The result is an overall project budget including details on schedule, construction costs, engineering costs, staff costs, overhead costs and right-of-way/land acquisition costs. This budgeting model produces detailed cash flow information by year and project phase in addition to detailed staffing information by phase and cost center or year and cost center. WTD will continue to improve the model over time.

Program Contingency

Program contingency provides an element of flexibility in reacting to changing circumstances across the entire CIP program. For the WTD CIP program, contingency is defined as 7.5 percent of the appropriation-year cash flow or \$10,000,000, which ever is less. Program contingency is identified as a single project (423545) and can be found under Central Functions.

Project Contingency Assumptions

Project contingency is added to a project to explicitly reflect the uncertainty about the future and as a buffer against the risk of under-funding a project. In WTD, CIP project contingency is calculated using standards recommended by the Association for Advancement of Cost Engineering (AACE) recommendations. The typical WTD CIP project goes through five phases; with each successive phase representing more complete and detailed project information. The five phases include planning, pre-design, design, construction, and closeout.

In the calculation of project contingency, the percentage of total project cost is specified according to the current phase of the project. The following table shows the percentage associated with the current phase of the project.

Project Phase	Percent Contingency
Planning	30
Predesign	20
Design	15
Construction	10
Close-out	0

The contingency is based on total project cost and entered in the close-out phase of the project. As the project moves through the phases, the contingency amount will decrease, reflecting the improvements in project definition and expected accuracy of the data.

Inflation Assumptions

The WTD CIP contains many multi-year projects in which price changes over time affect the cost of materials and services. There are many sources of inflation and prices do not always change at the same rate. For example, the cost of construction may increase relatively fast reflecting a strong local construction market. The WTD CIP assumes general prices change at 3 percent per year during the 2006-2011 period. This does not reflect a projection of any single inflation index but reflects a reasonable aggregate rate of increase for the next 6 years, based on the historical activity of both construction and non-construction price indices. Indices tracked include the Consumer Price Index, Implicit Price Deflator, the ENR Construction Cost Index and the Turner Building Cost Index.

Project Prioritization Methodology

In 2003, WTD initiated a new process to prioritize its capital projects for funding. This process combined WTD's former approach with the approaches used by other large west coast wastewater utilities. The new process evaluates each capital project against specific criteria that reflect WTD's missions and goals. Each project receives a score based on this evaluation, and the result was a numeric ranking of projects from first to last. This ranking, combined with the project cost estimates and other information, helps WTD managers identify which projects would be funded in the annual budgets. The process assumes that each proposed capital project is part of an approved comprehensive plan or has a sound business case, as demonstrated in a detailed project review form.

The prioritization system groups capital projects in three project categories, each with a set of criteria based on the division's mission statement.

1. **Major Capital** - projects that provide new capacity to the wastewater systems or add additional capacity to the system. Five categories of criteria are proposed for projects in the Major Capital projects in this category: (1) Regional Capacity Needs, (2) Public Health, Safety, and Property, (3) Regulatory or Contractual Requirements, (4) Natural Resources Protection, and (5) Cost Savings.
2. **Asset Management** - projects that rehabilitate or improve existing facilities, upgrade technologies, and improve processes or systems. Asset management projects typically do not increase capacity. Five categories are used to score Asset Management projects: (1) Service Disruption and Impacts from Asset Failure, (2)

Employee Safety, (3) Regulatory or Contractual Requirements, (4) Remaining Equipment Life/Asset Damage, and (5) Cost Savings.

3. **Planning** - projects that are more diverse in nature, such as planning work, studies, central administrative functions, and projects supporting the Water and Land Resources Division. Six categories are used to score Planning projects: (1) Regional Service Needs, (2) Public Health Protection, (3) Regulatory Compliance (4) Contractual Requirements or Mandates, (5) Natural Resources and Property Protection, and (6) Cost Savings.

The result of the ranking process is three lists of ranked projects, one for each category of project. Each category has its own budget allocation, so only like projects compete against each other for available for funding.

To assist with the prioritization process, WTD has compiled a set of guidelines for the consistent calculation of life-cycle costs and application of economic analyses to capital projects and alternatives. These analyses are an important element in defining projects from the Brightwater Treatment Plant to the combined sewer overflow (CSO) program update.

In addition, a major initiative encompassing a systematic and structured view of capital project decisions including economic analysis of project alternatives is under way in the asset management section. Business Case Evaluation (BCE) is a bottom up look at the capital project process that is providing the opportunity to work through a comprehensive framework that will form the basis of the program's capital decision making. Currently, case studies have been developed from which the lessons learned are being used to design and develop the form in which this process will be applied.

Project Categories

Capital projects carried out by WTD are grouped according to the major functions they serve in the wastewater system. There are thirteen functional categories in all. The spending authority for the first twelve of these categories is pooled at the fund level. For the thirteenth category, Minor Asset Management, the spending authority is defined at the level of the sub category.

1. South Treatment Plant
2. West Treatment Plant
3. Brightwater Treatment Plant
4. Vashon Treatment Plant
5. Conveyance Pipelines and Storage
6. Conveyance Pump Stations
7. Combined Sewer Overflow (CSO) Control
8. Infiltration and Inflow (I/I) Control
9. Biosolids Recycling
10. Water Reuse
11. Environmental Lab
12. Central Functions
13. Minor Asset Management

2006 Significant Project Highlights

Brightwater Treatment Plant and Conveyance Systems: 2006 Requested Budget \$306,204,845

In 2006 the Wastewater Treatment Division expects to begin construction related to site preparation for the plant and portals for the conveyance tunnel to be built in three segments.

Soos Creek Project: 2006 Requested Budget \$2,401,445

This project addresses increased capacity requirements in the Black Diamond area that will be needed by 2010.

North Creek Pipeline Project: 2006 Requested Budget \$2,937,217

In 2001, King County purchased the North Creek Interceptor from the Alderwood Water and Wastewater District (AWWD). Current forecasts indicate the pipeline, which is located in Snohomish County and the City of Bothell, will be under capacity by as much as 13 million gallons per day by 2010. To make capacity improvements to the pipeline, an agreement is underway between King County and the AWDD that would authorize AWWD to make pipeline improvements on behalf of King County.

Brightwater Reclaimed Water Pipeline Project: 2006 Requested Budget \$5,282,079

This proposed project involves the design and construction of pipelines to move reclaimed water from the Brightwater Treatment Plant. A dedicated pipe will run from Brightwater to Ballinger Way Portal inside the effluent tunnel included in the Brightwater project budget. The other dedicated pipe would run from the Brightwater Influent Pump Station through the Sammamish Valley. Collectively, these pipelines are referred to as the “backbone” of a reclaimed water supply system.

Future Water Reuse Planning Project: 2006 Requested Budget \$460,000

The County has made it a priority to develop a water supply plan to accomplish the following objectives:

- 1) integrate the use of reclaimed water into water supply planning and delivery;
- 2) assuring adequate supplies of water to meet the needs of fish under watershed-based salmon recovery plans; and
- 3) meet the long-term planning and other water supply needs under the Growth Management Act and other county-specific statutes.

A stakeholder group has been appointed by the Executive for the purpose of defining and developing a set of recommendations on scope, schedule, and budget for the planning process. The “Scoping Committee” includes members representing state agencies, water utilities, environmentalists, public health, local governments and others including the City of Seattle and the Muckleshoot Indian Tribe. The 2006 budget includes a \$460,000 request to cover planning and staffing costs likely to be recommended at a minimum by the Scoping Committee.

The following table displays major projects in the 2006 Executive Proposed Budget.

Significant Projects Wastewater Treatment Capital Improvement Plan		2006 Executive Proposed Budget	Continuation of Existing Project
423484	Brightwater Treatment Plant	\$43,215,242	X
423575	Brightwater Conveyance	\$262,989,603	X
	Soos Creek Project	\$2,401,445	
	North Creek Pipeline Project	\$2,937,217	
	Brightwater Reclaimed Water Pipeline	\$5,282,079	
423258	Future Water Re-Use Planning	\$460,000	X

Project Subcategories

To help make it easier to track projects they are further grouped into four primary subcategories: (1) asset management, (2) new facilities, (3) odor control, and (4) power management. Most wastewater capital projects fall under either asset management or new facilities, so the odor control and power management categories were added to logically differentiate the projects. Other subcategories are used, as well, to describe projects specific to two project categories: combined sewer overflows and minor asset management. Descriptions of those subcategories are provided under the related project category.

Asset Management

The Wastewater Treatment Division's Asset Management program strives to preserve asset value, system reliability, efficiency, and worker safety at lowest lifecycle costs. Preservation of wastewater assets is vital to our mission of protecting public health and environmental stewardship.

Infrastructure replacement and rehabilitation projects are funded as both stand-alone capital projects as well as under the Minor Asset Management program. WTD's Facilities Inspection group conducts comprehensive underground pipe assessments using both Closed Circuit TV (CCTV) as well as personnel access. Advanced methods of pipe rehabilitation are regularly implemented. Our engineering, operations and maintenance groups monitor condition status of mechanical, electrical and process assets within our system. Projects are now prioritized by their relative impacts on potential service disruptions/impacts, employee safety, regulatory or contractual requirements, estimated remaining asset useful life, and potential cost savings.

Work is now underway in WTD to develop business systems and practices to be able to more precisely predict the optimal point between increased operational maintenance costs and capital asset replacement. Other areas of improvement being addressed are increased use of life cycle cost analysis and proactive risk management.

New Facilities and Improvements

King County must provide the necessary wastewater capacity to serve the rapidly growing population in King County, south Snohomish County, and a small part of Pierce County.

Forecasts predict that more than 1 million more people will be living and working in King County by 2030, generating an additional 54 million gallons of wastewater each day (mgd). The Washington State Growth Management Act requires the county to have infrastructure available to serve this growth, and the recent amendment to the Comprehensive Water Pollution Abatement Plan (the RWSP) is the vehicle for meeting this requirement. The RWSP identifies wastewater capital projects to be constructed in the next 30 years, including the new 36-mgd Brightwater Treatment Plant, a marine outfall, several large conveyance pipes, and 22 CSO projects.

Odor Control

In December 2002, the WTD established odor control policies for its facilities. The King County Council adopted Ordinance 14712 (K.C.C. 28.86.050) to require the following:

- establish odor control goals for all treatment plants and conveyance facilities;
- design and operate odor control facilities to meet the goals;
- investigate potential technologies and costs;
- recommend a policy to the Council for inclusion in the RWSP; and
- achieve significant reduction of South Plant odors below 1993 air model levels.

Many odor control projects are intended to control the odor caused by hydrogen sulfide gas, thus limiting corrosion as well as improving air quality around WTD facilities. Examples include conducting odor studies and constructing or upgrading odor control facilities. Hydrogen sulfide (H₂S) results from the natural decomposition of organic material in raw sewage, especially in enclosed areas like pipes and holding basins. This colorless gas has an unpleasant rotten egg odor; and when combined with water in sewage pipes, it forms sulfuric acid, a compound that corrodes concrete pipes and degrades their structural integrity.

Power Management

There are two main types of power management projects. Projects of the first type implement Motion 11712, unanimously supported by the King County Council, to provide reliable power for safe and dependable wastewater treatment service.

The sewage backups and overflows that occurred during the widespread power outages caused by the Holiday Storm of 1996–97 and the Energy Crisis of 2000–2001 highlighted the need for onsite self-generation and standby generators at additional pump stations and treatment plants. Power supply is also made more reliable by upgrading existing equipment such as pump motors, switches, meters, and transformers.

The second type of projects conserves energy and provides quantifiable, long-term savings in energy costs. An example of this type of project is co-generation, where methane gas captured from the treatment process is used to power generators that would otherwise require electricity.

Green Building Initiative

WTD is supporting the King County Green Building Initiative. In this pursuit, WTD has initiated or completed the following actions:

- WTD staff serves on the King County Green Team.
- WTD has established a Green Team.

- Future revisions to the WTD CIP project management system will help with tracking green building implementation.
- An On-Call Green Building Consultant Contract is available for use by project managers to help them implement the green building initiative in their projects.
- Continued funding of the Environmental Building Newsletter to help project managers implement the green building initiative in their projects.
- Revision of the WTD specifications to include green building language.
- Projects incorporating Green elements include the Brightwater Treatment Plant and Conveyance, Juanita Pump Station, Carnation Treatment Plant, West Point Cogeneration, South Plant Cogeneration, Hidden Lake Pump Station, Pacific Pump Station, Swayolocken Pump Station, Interbay Pump Station, and Soos Creek Pump Station.

Growth Management and Comprehensive Plan

Both King County and Washington State require sewer comprehensive plans for all entities that provide sewage collection and treatment. These plans must include specific information such as a capital facilities inventory, and must undergo a formal public review process. The Washington State Growth Management Act (GMA) further requires King County to forecast the amount of wastewater infrastructure necessary to serve growth within the urban growth boundary, and to have this infrastructure available when growth occurs.

The King County Council adopted the Regional Wastewater Services Plan (RWSP), a supplement to the King County Comprehensive Water and Pollution Abatement Plan, in November 1999. The RWSP is the policy basis for the capital improvements necessary to provide wastewater services to this region for the next 30 years.

The RWSP utilizes the same assumptions with regard to future population and employment levels in the Puget Sound region as does the GMA and the King County Comprehensive Plan. When originally presented to the Council for adoption, the RWSP included an up-to-date inventory of existing facilities, a level of service definition, and an identification of needs to support the regional vision adopted under the GMA and the King County Comprehensive Plan.

CIP Program Accomplishments and Completion Lists

Projects Completed in 2004

A20010 South Treatment Plant - Asset Mgmt

423485 Treatment Plant Landscape Upgrade
423497 STP Alternate Disinfection Systems (RPT Study)

A20110 West Treatment Plant - Asset Mgmt

423323 WPTP - Process Safety Management & Risk Management Program
423328 WPTP - Digester Cleaning System
423334 WPTP - Sump Pump Wiring Modifications
423335 WPTP Waterproofing Phase II (Vandalism and Corrosion Protection)
423342 WP Post Construction Monitoring
423388 WPTP Digester Roof Anti-rotation Device
423425 WPTP other facility Improvements – EWRs

A20120 West Treatment Plant - New Facilities & Improvements

423403 WPTP Jameson Building - Bulk Oil Storage

A20140 West Treatment Plant - Power Mgmt

423385 WPTP Emergency Electrical Issues

A20410 Conveyance Pipelines and Storage - Asset Mgmt

423161 Brick Sewer Access Improvements & Misc. Repairs

A20420 Conveyance Pipelines and Storage - New Facilities & Improvements

423431 CP&S Enatai Interceptor H2S Repair Phase II

A20430 Conveyance Pipelines and Storage - Odor Control

423430 2001 ESI Lining Program
423568 North Creek Force Main Discharge Odor Control

A20520 Conveyance Pump Station - New Facilities & Improvements

423454 Kenmore PS Emergency Generator

A20530 Conveyance Pump Station - Odor Control

423471 North Portal Odor Control

A20540 Conveyance Pump Station - Power Mgmt

423396 Standby Generator Loadbanks

A21100 Central Functions

423050 Earthquake Strengthening

Projects to be Completed in 2005

A20000 South Treatment Plant

423001 Denny Way/Lake Union CSO Control Project

A20010 South Treatment Plant - Asset Mgmt

423567 Structural Repairs To Earthquake Damaged Facilities

A20020 South Treatment Plant - New Facilities & Improvement

423571 Digestion Enhancement / Full-Scale Operation Testing

423572 STP Dewatering Equipment Replacement

A20040 South Treatment Plant - Power Mgmt

423548 STP Cogeneration

A20110 West Treatment Plant - Asset Mgmt

423461 WPTP Clarifier Painting/Coating Phase II

A20420 Conveyance Pipelines and Storage - New Facilities & Improvements

423107 Mill Creek Relief Sewer

423519 North Creek Storage Facility

A20430 Conveyance Pipelines and Storage - Odor Control

423269 ESI Lining Program H2S Repair

423527 EBI Odor Study

A20510 Conveyance Pump Station - Asset Mgmt

423303 Swayolocken PS - Pump Motors Drives

423564 Barton - Murray - 53rd Avenue - 63rd Avenue - VFDS - MCCA - Alki Pump Stations
Electrical Upgrades

A20540 Conveyance Pump Station - Power Mgmt

423154 South Mercer PS - Emergency Generator

A20620 Combined Sewer Overflow - New Facilities & Improvements

423003 Ravenna Creek Pipeline
423179 Henderson/MLK CSO
423350 WCC / Ravenna Creek

A20650 Combined Sewer Overflow Control - Remediation

423056 NOAA Misc. Outfall Sediment Remediation

A20920 Water Reuse - New Facilities

423523 RWSP Water/Wastewater Conservation Program

A21010 Environmental Laboratory - Asset Mgmt

423570 Trace Metals ICP-MS

A21100 Central Functions

423558 Transfer To SWM Fund 3292 - Hamm Creek #0E1645

Projects to be Completed in 2006

A20010 South Treatment Plant - Asset Mgmt

423487 East Division Secondary Tank Coating
423574 STP Fire Alarm System Upgrade

A20020 South Treatment Plant - New Facilities & Improvement

423585 South Plant Odor Improvements

A20040 South Treatment Plant - Power Mgmt

423408 Fuel Cell Demonstration Project

A20110 West Treatment Plant - Asset Mgmt

423341 PLC Replacements

A20120 West Treatment Plant - New Facilities & Improvements

423584 West Point Odor Improvements

A20410 Conveyance Pipelines and Storage - Asset Mgmt

423578 Bellevue Interceptor Pipe Replacement

A20420 Conveyance Pipelines and Storage - New Facilities & Improvements

423121 Madsen Creek Erosion & Sewer Stabilization

A20430 Conveyance Pipelines and Storage - Odor Control

423439 Fremont Siphon Odor Control

423468 ESI Chemical Injection

A20510 Conveyance Pump Station - Asset Mgmt

423562 Matthews Beach PS/Force Main Repair

A20530 Conveyance Pump Station - Odor Control

423590 Murray Avenue Pump Station Odor Control System Upgrade

A20540 Conveyance Pump Station - Power Mgmt

423236 York PS - Upgrade & Power Reliability

A20620 Combined Sewer Overflow - New Facilities & Improvements

423489 Carkeek Overflow Reduction

423587 Dechlorination Systems at CSO Facilities (Alki and Carkeek)